WHAT IS CLAIMED IS:

1. A compact holographic data storage system, comprising:

a volume holographic recording medium (10) for storing superimposed interference patterns;

a laser beam emitting assembly (20) having a large output area for emission of parallel laser beams with proper wavelength and cross sectional shape;

a beam splitter (50) being disposed in the optical path of parallel beams for separating out a portion of the parallel beams;

a beam steering system (60) for steering the partially separated beam as reference beam, such that the reference beam can be directed into the volume holographic recording medium (10) with a proper incident position and angle and cross sectional phase distribution; and

a spatial light modulator (40) composing of light gating components disposed in the optical path of parallel beams for holographic data input;

a photo detectors (70) as two dimensional grating format for detecting regenerated signal after the reference beam is directed to the volume holographic recording medium (10), during data read from the holographic medium (10).

2. The compact holographic data storage system as claimed in claim 1, wherein the laser beam emitting assembly (20) generates laser beams to pass through a cylindrical collimated lens and a rectangular aperture to become parallel beams with proper cross sectional shape.

3. The compact holographic data storage system as claimed in claim 1, wherein the laser beam emitting assembly (20) disposed in the center of focus

area of the cylindrical collimated lens is composed of a group of laser diodes with different wavelength, and a servo mechanism for fixing laser diode with selected wavelength.

4. The compact holographic data storage system as claimed in claim 2, wherein the laser beam emitting assembly (20) disposed in the center of focus area of the cylindrical collimated lens is composed of a single laser diode that can be adjusted to different wavelength.

5. The compact holographic data storage system as claimed in claim 1, wherein the beam splitter (50) disposed in the optical path of parallel beams is composed of a reflective mirror for separating out a portion of the parallel beams in slices as reference beam to be directed to the beam steering system (60).

6. The compact holographic data storage system as claimed in claim 1, wherein the beam splitter (50) disposed in the optical path of parallel beams is composed of a narrow rectangular aperture for separating out a portion of the parallel beams in slices as reference beam to be directed to the beam steering system (60).

7. The compact holographic data storage system as claimed in claim 1, wherein the beam steering system (60) is formed by a number of reflective mirrors and a servo mechanism used for controlling the reflective angle of the mirror and the mirror position to direct the reference beam into the volume holographic recording medium (10).

8. The compact holographic data storage system as claimed in claim 1, wherein the beam steering system (60) is an opto-electronic steering device using the built-in opto-electronic mechanism to control theincident position and angle

of the reference beam into the volume holographic recording medium (10).

9. The compact holographic data storage system as claimed in claim 1, wherein the beam steering system (60) further includes a phase modulator in the optical path of laser beam to modulate a reference beam with proper cross sectional phase distribution.

10. The compact holographic data storage system as claimed in claim 9, wherein the phase modulator (61) can be implemented by a fully transmissive LCD panel, such that beams can pass through different positions of the LCD panel demonstrating different phase delay characteristics.

11. The compact holographic data storage system as claimed in claim 1, wherein the spatial light modulator (40) can be implemented with a two dimensional transmissive LCD panel for controlling ON/OFF of the light gating components as parallel beams pass therethrough serving as input apparatus to the holographic recording medium.

12. The compact holographic data storage system as claimed in claim 1, wherein the spatial light modulator (40) can be implemented with a two dimensional reflective LCD panel for controlling reflection or no reflection on the light gating components as the parallel beams pass therethrough serving as an input apparatus to the holographic recording medium.

13. The compact holographic data storage system as claimed in claim 1, wherein the photo detector (70) can be implemented with a charge couple detector (CCD) camera for detecting the reconstructed beam as the reference beam enters the volume holographic recording medium (10) acting as a data readout apparatus for the holographic medium.

14. The compact holographic data storage system as claimed in claim 1, wherein the volume holographic recording medium (10) is formed by diffractive crystals made from $LiNbO_3$:Fe or $BaTiO_3$.

15. The compact holographic data storage system as claimed in claim 1, wherein the volume holographic recording medium (10) is formed by organic photo-sensitive material.